Environmental Engineering

Code: 106765
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Sciences	OB	3

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Students must be able to work in solving equations, chemical formulation, stoichiometry, to find out molecular weight of elements, calculate number of moles, and conversion from one system of units to another.

Objectives and Contextualisation

- To understand some relevant environmental engineering processes analyzing unit operations involved.
- To perform mass and energy balances in environmental systems.
- To understand the usefulness of matter and energy balances in the field of Environmental Sciences.
- To apply the concept of "ideal reactor" in environmental engineering.

Learning Outcomes

1. CM33 (Competence) Undertake a general assessment of the social, economic and environmental impact on industrial activities and facilities.
2. CM34 (Competence) Undertake partial environmental projects in the field of technology within a team.
3. KM42 (Knowledge) Identify the principles in the main areas of environmental engineering.
4. KM44 (Knowledge) Recognise the systems, equipment and facilities of environmental engineering and the associated industrial processes.

5. SM42 (Skill) Assess the analysis and synthesis strategies related to the environmental implications of industrial processes.
6. SM43 (Skill) Extract relevant information from engineering or technological projects related to environmental issues.

Content

UNIT 1. INTRODUCTION TO ENVIRONMENTAL ENGINEERING
Principles. Unit operations. Continuous and discontinuous operations. Steady and unsteady state. Type of reactors.

UNIT 2. MASS BALANCES APPLIED IN SYSTEMS WITHOUT REACTION
Concept of balance. Applicability of balances. Applicability of mass balances in Environmental Sciences.

Mass balances in systems without reaction under steady state operation. Balances in multiple units systems. Systems with recycle, purge, and bypass flows. Mass balances
in systems without reaction operating under unsteady state.

UNIT 3. MASS BALANCES APPLIED IN SYSTEMS WITH REACTION
Stoichiometry. Measurement of changes in composition. The rate of reaction. Ideal reactors' design equations. Comparison among ideal reactors.

UNIT 4. ENERGY BALANCES
Forms of energy. The general energy balance. Simplified forms. Energy balance at steady state. Heat energy balance. Mechanical energy balance.

APPLICATION OF MASS AND ENERGY BALANCES: LIFE CYCLE ASSESSMENT.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problems classes: Resolution of problems corresponding to the subject. Discussion with the students about the solution strategies and their execution.	14	0.56	
Seminars	6	0.24	
Theory lectures: Master classes on the concepts of the syllabus with application examples.	28	1.12	
Type: Autonomous			
Autonomous learning	60	2.4	
Collaborative learning	36	1.44	

Theory lessons: presentation of the different topics of the syllabus. During theory lessons and as a fundamental part of the learning process examples of application for these topics will also be. presented.

Problem classes: resolution of exercises related to the subject. Discussion with the students about the solving strategies and their execution.

Seminars: practical application of the basis of environmental engineering on environmental sciences. Some exercices will be proposed to be solved in "exam mode" to be evaluated.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First exam	45%	3	0.12	CM33, KM42, KM44, SM42
Second exam	45%	3	0.12	CM33, CM34, KM42, KM44, SM42, SM43
Solved exercices delivery	10%	0	0	KM44, SM42, SM43

The subject consists of the following evaluation activities:

- Two partial exams including theory and exercices (45% each exam)

- Delivery of exercices solved during the seminars (10%).

Non-participation in any of these evaluation activities will be assessed with a zero.

For a student to pass the subject through continuous assessment it is necessary to obtain a minimum weighted grade of 5 in the global of the subject. To be able to make a weighted average between the delivery of exercices and the grade of the partial tests, a minimum average grade of 4 out of 10 of the partial tests will be required with a minimum mark of 3 in each of the partial tests.

If grade 5 is not achevieved globally, the student may undergo a resit exam only if he/she has been previously evaluated in a set of activities that represent a minimum of two thirds of the total qualification of the subject. The resit exam has two parts, each of them corresponding to one of the partial exams. The student must solve the part (or parts) not passed. In this case, exercices delivering mark remains unchanged. The calculation of the final grade, in the resit process, will be done in the same way as in the continuous assessment and with the same minimum grade criteria.

For each assessment activity with an individual weight of more than 20%, a review place, date and time will be indicated where the activity can be reviewed in person. In this context, claims can be made about the grade of the activity, which will be evaluated by the teaching staff responsible for the subject. If the student does not undergo this review, the activity will not be reviewed later. For the rest of the activities, the student will have a period of 48 hours, from the moment the grade is published, to request a review.

Following UAB regulations, students with a grade of 9.0 or higher in a subject may be qualified by an Honors degree. The number of Honors degrees awarded to students cannot be higher than 5% of the total number of students enrolled in a subject. In this subject, in order to qualify for the Honors degree, in addition to the previous criteria, a grade equal to or higher than 8.5 in each of the assessable activities is needed. Also, students taking any resit exam will be excluded.

A student will be considered non-evaluable (NA) if he/she has not undertaken some of the partial exams or the resit exam.

Students coursing the subject for a second or thirdyear must undergo the above listed evaluation activities.

Without prejudice to other disciplinary measures, and in accordance with current academic regulations, any irregularities committed by the student that could lead to a variation of the score of an evaluation act will be marked with a zero. Therefore, copying or allowing to copy in an evaluation activity will imply a zero (0).

Unique assessment. Students who have accepted the single assessment modality must take a final synthesis test on the date marked in the exam calendar as the second exam. This test will consist of a theory part (30% of the mark) and a problem part (70% of the mark). If the final grade does not reach 5, the student has another chance to pass the subject by means of the resit exam (on the date marked for the make-up exam of the subject).

Bibliography

- Aucejo, A. i col. (1999) "Introducció a l'Enginyeria Química" Pòrtic. Biblioteca Universitària. Ed. Enciclopèdia Catalana.
- Bouzas i col. (2007). Bases d'Enginyeria Ambiental. Editorial Universitat de València. Versió en línia, Biblioteques UAB.
- Izquierdo J.F. i col. (2011). Introducción a la Ingeniería Química. Problemas resueltos de Balances de Materia y Energía. Editorial Reverté.
- Davis M.L., Cornwell D.A. (1991) "Introduction to Environmental Engineering". McGraw-Hill,
- Reklaitis G.V. (1986) "Balances de materia y energía". Ed. Interamericana
- Himmelblau D. (1997) "Principios básicos y cálculos en Ingeniería Química". Prentice-Hall Hispanoaméricana
- Peavy H.S., Rowe D.R., Tchobanoglous G. (1985) "Environmental Engineering". McGraw-Hill,
- Costa, J. i col. (1991) "Química Técnica : Introducción a los Procesos, las Operaciones Unitarias y los Fenómenos de Transporte en Ingenieria Química". Ed. Reverté.(versió electrònica biblioteca UAB)
- Stephenson, T. (2002) "Process Science and Engineering for Water and Wastewater Treatment" IWA Publishing
- Mihelcic J.R. (2001) "Fundamentos de ingeniería ambiental". Limusa Wiley.
- Masters, G.M., Elia, W.P. (2007) "Introducción a la Ingeniería Medioambiental". Prentice-Hall International, Inc.

Software

No specific software is recommended.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	morning-mixed

(SEM) Seminars	1	Catalan	first semester	morning-mixed
(SEM) Seminars	2	Catalan	first semester	morning-mixed
(TE) Theory	1	Catalan	first semester	morning-mixed